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(54) CARBON BLACK PIGMENT FOR WATER-BASED INK

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a carbon black pigment having excellent dispersion performance into water and suitable for a water-based black ink.

SOLUTION: The carbon black pigment for a water-based ink has an atomic ratio (the intensity of oxygen bonding energy/that of carbon bonding energy) of the entire oxygen atoms to the entire carbon atoms, measured by X-ray photoelectron spectroscopy, of ≥ 0.1 by chemically modifying carbon black having a nitrogen adsorption specific area (N2SA) of 200-270 m²/g, an iodine adsorption amount (IA) of 190-260 mg/g, a ratio of N2SA to IA of 0.96-1.20, a CTAB specific area of 170-240 m²/g, a DBP absorption amount of 100-150 cm³/100 g, a 24M4DBP absorption amount of 90-120 cm³/100 g, and a Tint of ≥ 135 . Furthermore, the carbon black pigment has particle properties such that the modal diameter D_{st} of a stokes diameter distribution of an aggregate is 30-60 nm; the half width ΔD_{st} in the distribution is ≤ 60 nm; the Dupa 50% value of the average particle diameter of an agglomerate is 60-110 nm; and the Dupa 99% value of the maximum diameter of the agglomerate is ≤ 210 nm.

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CLAIMS

[Claim(s)]

[Claim 1] 200-270m²/g and the iodine amount of adsorption (IA) 190 - 260 mg/g, [nitrogen adsorption specific surface area (N₂SA)] 0.96-1.20, and CTAB specific surface area 170-240m²/g, [the value of N₂ SA/IA] 3/100g and a 24M4DBP absorbed amount 90-120cm 100-150cm 3/100g, [a DBP absorbed amount] Tinting strength (Tint) 135 or more The carbon black pigment for water color ink characterized by the atomic ratio (reinforcement of the reinforcement / carbon to carbon bond energy of oxygen binding energy) of the total carbon atom and all the oxygen atoms which carried out chemical modification of the ** carbon black, and were measured by X-ray photoelectron spectroscopy being 0.1 or more.

[Claim 2] The carbon black pigment for water color ink according to claim 1 with which the value whose value of 60nm or less and mean-particle-diameter Dupa50% of agglomerate half-value-width deltaDst [in / in the mode diameter Dst of stokes nominal diameter distribution of an aggregate / 30-60nm and an isomerism cloth] is 60-110nm and maximum grain size Dupa99% of agglomerate has the shape of corpuscular character 210nm or less. However, Dst is a centrifuge (DCF). The stokes nominal diameter of the maximum frequency in stokes nominal diameter distribution of the aggregate measured and deltaDst irradiate laser light at the water dispersion of carbon black to half-value width and Dupa50% of this stokes nominal diameter distribution, and Dupa99% shows the value [in / for the value of 50% cumulative frequency in the cumulative frequency distribution curve of the agglomerate particle size created from the frequency modulation degree of the scattered light / an isomerism cloth curve] of 99% cumulative frequency.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is excellent in underwater dispersibility ability, and relates to the carbon black pigment for water color ink suitable as an object for aqueous black ink.

[0002]

[Description of the Prior Art] Since wettability [as opposed to water at hydrophobicity] of carbon black is low, it is very difficult to distribute stability by high concentration to underwater. This originates in that there are very few functional groups with high compatibility with the water molecule which exists in a carbon black front face. Then, the approach of carrying out oxidation reforming of the carbon black, and forming the functional group of a hydrophilic property in a front face is learned for many years.

[0003] For example, to JP,48-18186,A, carbon black is oxidized in the water solution of the following ** halogen acid salt, and in more nearly subsequently than the system of reaction carrying out separation uptake of the oxidization carbon black, the manufacture approach of water-dispersion reforming carbon black that the manufacture approach of the oxidization carbon black characterized by washing by the organic solvent is characterized by carrying out low-temperature-oxidation plasma treatment of the carbon black to JP,57-159856,A again is indicated.

[0004] Useful [of the carbon black excellent in water-dispersion] is carried out as watercolor pigment ink, it begins a writing implement, and attracts attention also as recording ink especially for ink jet printers etc. in recent years. In the watercolor pigment ink which contains water and carbon black in JP,8-3498,A as water color ink using easy water dispersible carbon black In the manufacture approach of the watercolor pigment ink in which this carbon black has the surface activity hydrogen content of 1.5 or more mmol/g, and the watercolor pigment ink containing water and carbon black (a) The process which obtains acid carbon black, and (b) The manufacture approach of the watercolor pigment ink which includes the process which oxidizes said acid carbon black further with the following ** halogen acid salt underwater is proposed. Moreover, the manufacture approach of the watercolor pigment ink which includes process; which oxidizes this carbon black using process; and the following ** halogen acid salt which carry out micro-disperse of the absorbed amount carbon black 3/100g or less of 100cm into an aqueous medium is indicated by JP,8-319444,A.

[0005] In above-mentioned JP,8-3498,A and above-mentioned JP,8-319444,A, carbon black is oxidized, and by making a front face contain many active hydrogen which is the functional group of a hydrophilic property, water-dispersion is good and obtains watercolor pigment ink excellent in prolonged distributed stability. However, in order for carbon black to distribute underwater and to maintain a stable distributed condition, it is difficult to judge the quality of dispersibility exactly only by regulating the amount of functional groups to which the amount of functional groups of the hydrophilic property which exists in the contact interface of a carbon black particle front face and a water molecule functions greatly, and only exists in per carbon black unit weight.

[0006] Then, this invention persons advanced research paying attention to the amount of hydrogen content functional groups of the hydrophilic property which considers as the new index which judges the

quality of dispersibility ability exactly, and exists in per carbon black unit surface area, and developed and proposed the easy water dispersible carbon black whose amounts of total of a carboxyl group and hydroxyl are two or more 3microeq/m per unit surface area, and its manufacture approach among the hydrogen content functional groups which exist in a front face (JP,11-148027,A).

[0007]

[Problem(s) to be Solved by the Invention] this invention persons advanced research about the underwater dispersibility ability of carbon black succeeding, and succeeded in development of a carbon black pigment suitable as ink for printers, such as water color ink (trademark), for example, bubble jet etc., using easy water dispersible carbon black excellent in underwater dispersibility as a black pigment.

[0008] That is, the purpose of this invention is to offer the carbon black pigment excellent in paper fixing concentration, printing grace, regurgitation stability, lightfastness, preservation stability, etc. for water color ink, when printing to a form, an OHP sheet, art paper, etc. chiefly, a regular paper and.

[0009]

[Means for Solving the Problem] The carbon black pigment for water color ink of this invention for attaining the above-mentioned purpose 200-270m²/g and the iodine amount of adsorption (IA) 190 - 260 mg/g, [nitrogen adsorption specific surface area (N₂SA)] 0.96-1.20, and CTAB specific surface area 170-240m²/g, [the value of N₂ SA/IA] 3/100g and a 24M4DBP absorbed amount 90-120cm 100-150cm 3/100g, [a DBP absorbed amount] It is characterized by the atomic ratio (reinforcement of the reinforcement / carbon to carbon bond energy of oxygen binding energy) of the total carbon atom and all the oxygen atoms which tinting strength (Tint) carried out chemical modification of the carbon black of or more 135**, and measured by X-ray photoelectron spectroscopy being 0.1 or more on a configuration.

[0010] Moreover, the carbon black pigment for water color ink of this invention is carbon black equipped with the above-mentioned property, and the mode diameter D_{st} of stokes nominal diameter distribution of an aggregate is characterized by the value whose value of 60nm or less and mean-particle-diameter D_{upa}50% of agglomerate half-value-width deltaD_{st} in 30-60nm and an isomerism cloth is 60-110nm and maximum grain size D_{upa}99% of agglomerate having the shape of corpuscular character 210nm or less on a configuration. However, D_{st} is a centrifuge (DCF). The stokes nominal diameter of the maximum frequency in stokes nominal diameter distribution of the aggregate measured and deltaD_{st} irradiate laser light at the water dispersion of carbon black to half-value width and D_{upa}50% of this stokes nominal diameter distribution, and D_{upa}99% shows the value [in / for the value of 50% cumulative frequency in the cumulative frequency distribution curve of the agglomerate particle size created from the frequency modulation degree of the scattered light / an isomerism cloth curve] of 99% cumulative frequency.

[0011]

[Embodiment of the Invention] When it considers as water color ink for nitrogen adsorption specific surface area (N₂SA) to be under 200m²/g, the rate of precipitate residue increases, if filterability and regurgitation stability fall remarkably and exceed 270m²/g, a carbon black aggregate will become small and the paper fixing concentration at the time of printing will become low. Moreover, there is little volatile matter (surface functional group) of carbon black that the value of N₂ SA/IA is less than 0.96, wettability with an oxidizer water solution worsens and dispersibility falls. However, if the value of N₂ SA/IA exceeds 1.20, the unburnt matter of carbon black will cause many trouble to wettability with an oxidizer water solution, oxidation is not fully performed, but dispersibility falls.

[0012] The area of liquid-***** becomes it small that CTAB specific surface area is under 170m²/g, and although it can do simply, particle-size size becomes large, and surface chemistry qualification produces a problem to filterability and sedimentation nature. Moreover, if CTAB specific surface area exceeds 240m²/g, the area of liquid-***** will become large, it becomes difficult to carry out chemical modification to homogeneity, and dispersibility becomes inadequate. Moreover, since it will be the inclination for particle size to become small even if it acquires sufficient dispersibility, paper fixing concentration falls.

[0013] Since the configuration of primary floc is a form near a globular form when it prints on paper that a DBP absorbed amount is 100cm less than 3/100g as a carbon black dispersing element, the omission from the pore of paper is produced and printing concentration becomes thin. Moreover, if 3/100g is exceeded 150cm, the configuration of primary floc will become complicated conversely, the omission of paper pore will decrease, whenever [black] will improve, but since appearance particle size becomes large, sedimentation nature and filterability worsen. The same DBP absorbed amount phenomenon as less than 3/100g of 100cm happens that a 24M4DBP absorbed amount is 90cm less than 3/100g, and whenever [black] falls. If a 24M4DBP absorbed amount exceeds 3/100g 120cm, sedimentation nature, filterability, and preservation stability will become a defect. Tint Whenever [grain / which is less than 135], since broadcloth [distribution], filterability and sedimentation nature become a defect.

[0014] In addition to these property range, the carbon black pigment for water color ink of this invention is characterized by the point that the value of the atomic ratio (reinforcement of the reinforcement / carbon to carbon bond energy of oxygen binding energy) of the total carbon atom and all the oxygen atoms which were measured by X-ray photoelectron spectroscopy is 0.1 or more as an amount of functional groups which exists in the front face by chemical modification. When self-dispersibility [as opposed to / that the intensity ratio (atomic ratio) of the reinforcement / carbon to carbon bond energy of the oxygen binding energy measured by X-ray photoelectron spectroscopy, such as XPS and ESCA, is less than 0.1 / polar solvents, such as water,] falls remarkably and considers as water color ink, preservation stability will get worse extremely. In addition, accommodation of this intensity ratio makes a carbon black particle front face oxidize chemically by oxidation treatment, and is performed by forming a hydrophilic functional group by carrying out chemical modification.

[0015] Oxidation treatment is performed by adding carbon black and oxidizing in oxidizing agent water solutions, such as alkali-metal salts, such as a hypochlorite, chlorite, a chlorate, persulfate, a perboric acid salt, and percarbonate, and ammonium salt, controls suitably the concentration of an oxidizing agent water solution, the addition of carbon black, reaction temperature, reaction time, etc., and it is processed so that the atomic ratio (reinforcement of the reinforcement / carbon to carbon bond energy of oxygen binding energy) of a total carbon atom and all oxygen atoms may become 0.1 or more.

[0016] Furthermore, as for the carbon black pigment for water color ink of this invention, it is more desirable that the value whose value of 60nm or less and mean-particle-diameter Dupa50% of agglomerate half-value-width deltaDst [in / in the mode diameter Dst of stokes nominal diameter distribution of a carbon black aggregate / 30-60nm and an isomerism cloth] is 60-110nm and maximum grain size Dupa99% of agglomerate is equipped with the shape of corpuscular character 210nm or less in addition to the above-mentioned property.

[0017] The agglomerate particle size in a moisture powder condition becomes it small that the mode diameter Dst of stokes nominal diameter distribution of an aggregate is less than 30nm, whenever [black] falls, and if 60nm is exceeded, although whenever [black] will improve on the other hand, sedimentation nature and filterability fall. Moreover, the diameter distribution of a grain whose half-value-width deltaDst exceeds 60nm becomes broadcloth, and whenever black, sedimentation nature and filterability become a defect.

[0018] Moreover, as for making the value of 60-110nm and maximum grain size Dupa99% of agglomerate into the shape of corpuscular character 210nm or less, carbon black passes the value of mean-particle-diameter Dupa50% of agglomerate from the clearance between paper fiber as Dupa50% of value is less than 60nm, and paper fixing concentration falls. Although whenever [black] will improve on the other hand if 110nm is exceeded, it is for filterability and sedimentation nature to get worse. Moreover, if Dupa99% of value exceeds 210nm, sedimentation nature, regurgitation stability, and filterability will fall remarkably.

[0019] In addition, the value from which the above-mentioned properties Dst and delta Dst and Dupa50%, and Dupa99% were obtained by the following measuring method is used.

(1) stokes mode diameter Dst(nm) half-value-width deltaDst(nm); JIS of an aggregate K6221 (1982) -- the 20 capacity % ethanol water solution which contains a little surface active agent for the carbon black

sample dried based on 5 "how to make a dried sample" -- mixing -- carbon black concentration 0.1 kg/m³ Dispersion liquid are created, this is fully distributed ultrasonically, and it considers as a sample. Disk centrifuge equipment (British Joyes Lobel shrine make) is set as the rotational frequency of 100 s⁻¹, and they are 0.015dm³ about spin liquid (a 2-% of the weight glycerol water solution, 25 degrees C). 0.001dm³ after adding Buffer liquid (a 20 capacity % ethanol water solution, 25 degrees C) is poured in. Subsequently, carbon black dispersion-liquid 0.0005dm³ with a temperature of 25 degrees C After adding with a syringe, centrifugation is started and the distribution curve (axis of abscissa; the elapsed time after adding carbon black dispersion liquid with a syringe, absorbance in the specifying point of having changed in connection with the centrifugation of axis-of-ordinate; carbon black) which coincidence is operated and shows a recorder to it at drawing 1 is created. Each time amount T is read from this distribution curve, and the stokes nominal diameter corresponding to each time amount is computed by substituting for a degree type (several 1).

[0020]

[Equation 1]

$$Dst \text{ (nm)} = \sqrt{\frac{1.0498 \times 10^6 \cdot \eta}{N^2 (\rho_{CB} - \rho_1)} \log \frac{r_2}{r_1}} \times \sqrt{\frac{1}{T}} \times 10^6$$

[0021] Setting to several 1, eta is the viscosity (0.935x10⁻³ Pa-s) of spin liquid, and N is disk rotation speed (100 s⁻¹) and r₁. For the radius (0.0456m) of the point pouring [carbon black dispersion-liquid] in, and r₂, the radius (0.0482m) by absorbance point of measurement and rho_{CB} are the consistency (kg/m³) of carbon black, and rho₁. It is the consistency (1.00178 kg/m³) of spin liquid.

[0022] Thus, distance between two size which is equivalent to the stokes mode diameter Dst of an aggregate (nm) and one half of the frequency of the maximum frequency in the obtained stokes nominal diameter and the stokes nominal diameter of the maximum frequency in the distribution curve (drawing 2) of an absorbance is set to half-value-width deltaDst (nm).

[0023] (2) Mean-particle-diameter Dupaof agglomerate50%(nm) maximum grain size Dupa99% (nm); in addition, the value from which mean-particle-diameter Dupa50% of this agglomerate and maximum grain size Dupa99% were obtained by the following measuring method is used. Carbon black is distributed in water and it is 0.1-0.5kg/m³. Dispersion liquid are prepared, laser light is irradiated at dispersion liquid using a heterodyne laser Doppler system particle-size-distribution measuring device (micro truck company make, UPA model 9340), and the particle size of the agglomerate in dispersion liquid is measured from the degree of the frequency modulation of the scattered light. Brownian motion of the carbon black in dispersion liquid is carried out, and the frequency of the scattered light becomes irregular with the magnitude of the carbon black floc currently distributed according to the Doppler effect. Therefore, since the violence of the Brownian motion by the magnitude of floc differs, the magnitude of the floc in the condition of distributing underwater, i.e., the particle size of agglomerate, can be measured. Thus, the cumulative frequency distribution curve is created from the measured agglomerate particle size, and mean-particle-diameter Dupa50% of agglomerate (nm) and the value of 99% cumulative frequency are made into maximum grain size Dupa99% of agglomerate (nm) for the value of cumulative frequency 50%.

[0024] there is a carbon black pigment for water color ink of this invention about all end hydrogen, such as -COOH radical formed in the carbon black particle front face, and -OH radical, although chemical modification of the carbon black particle front face is carried out by oxidation treatment and a hydrophilic functional group is formed -- it is -- if the part is permuted by alkali metal, the amino group, etc., dispersibility can be raised more. In addition, the carbon black pigment for water color ink of this invention is obtained by carrying out separation removal and refining the residual salt generated by oxidation reaction.

[0025] Water color ink is obtained by making it distribute by desired concentration in aquosity media,

such as water, by using carbon black equipped with these properties as a black pigment. That is, pH of the water dispersion which distributed carbon black is adjusted to 6-11, and separation purification of the residual salt is carried out by electrodialysis or demarcation membranes (a reverse osmotic membrane, ultrafiltration membrane, loose R.O, etc.). In this case, the residual salt concentration in carbon black dispersion liquid makes 20wt(s)% for example, carbon black content concentration, and conductivity is 5 mS/cm. It is desirable to carry out separation purification so that it may become the following. Moreover, in order to plan distributed stability as water color ink, it is desirable to adjust a ** carbon black pigment to the concentration not more than 60wt%.

[0026] Hereafter, the example of this invention is concretely explained as contrasted with the example of a comparison.

[0027] Carbon black 90g from which the property shown in one to examples 1-3 and example of comparison 4 table 1 differs It adds in 3000ml of sodium persulfate water solutions with a concentration of 2.5 Ns, and they are the reaction temperature of 60 degrees C, reaction-time 10 hours, and agitating speed 300rpm. It oxidized. Subsequently, the carbon black carried out the ** exception was distributed in pure water, the sodium-hydroxide water solution neutralized, and the salt which carries out purification processing by ultrafiltration membrane (Asahi Chemical, AHP-1010, cut off molecular weight 50000), and remains was separated. The conductivity of the dispersion liquid after purification was 0.6 mS/cm (carbon black content concentration 22wt%).

[0028] It oxidized by example of comparison 5 ozone, and also carbon black dispersion liquid were produced by the same approach as an example. In addition, the conductivity of dispersion liquid was 0.5 mS/cm (carbon black content concentration 12wt%).

[0029]

[Table 1]

translation

例No. 特性	実施例			比較例				
	1	2	3	1	2	3	4	5
IA	193	207	224	120	160	144	240	193
N ₂ SA	204	216	244	135	160	170	244	204
N ₂ SA/IA	1.057	1.043	1.089	1.125	1.000	1.181	1.018	1.057
CTAB	173	162	211	128	150	160	205	173
DBP	129	116	145	56	65	115	80	129
24M4DBP	107	99	118	49	58	100	65	107
Tint	139	136	142	145	140	141	145	139
Dst(nm)	55	57	57	47	50	60	32	55
ΔDst(nm)	44	40	47	32	35	44	23	44
Dupa50%(nm)	104.2	94.8	98.7	41.5	32.1	90.5	34.5	142.5
Dupa99%(nm)	205.1	198.9	191.2	162.3	145.2	195.4	142.1	345.6
原子比 *1	0.34	0.35	0.33	0.33	0.33	0.34	0.33	0.05

*1 Surface Science Instruments 社製 S-Probe BSCA 2803型により測定。測定は有
 状態の試料表面についてワイドスキャン測定（定性分析）を行い、検出された元素
 の高分解測定（状態分析）を行った。結合エネルギーは、C-C、C-Hを284.6 eV
 として基準化し、酸素結合エネルギー強度と炭素結合エネルギー強度の比を求めた。

[0030] The carbon black content concentration of carbon black dispersion liquid was adjusted to 20wt (s)%, water color ink was prepared, the following approach estimated dispersibility ability, the ink engine performance, etc., and the result was shown in Table 2.

[0031] ** Preservation stability; the sample was put in the well-closed container and the viscosity change for one to four weeks was measured in the 70-degree C attemperator. In addition, viscosity was measured with the rotational-vibration type viscometer [Yamaichi Electronics make and VM-100 A-L].

[0032] ** Particle diameter measurement; the particle diameter of the sample which performed the trial of a sample and preservation stability was measured using the heterodyne laser Doppler system particle-size-distribution measuring device [micro truck company make and UPA model 9340]. If a laser beam is applied to the particle which is carrying out Brownian motion into suspension, the frequency of the scattered light will modulate this measuring device according to the Doppler effect. The violence of Brownian motion, i.e., particle diameter, is measured from the modulation degree of the frequency.

[0033] ** Printing concentration; the carbon black content concentration of water color ink is diluted to 4wt(s)%, use XEROX 4024 paper as copy paper, print by #6 bar coater to this, and it is Macbeth concentration meter [COL mho gene company make. Optical density was measured using RD-927].

[0034] ** Filterability; it is NO.2 filter paper and film aperture of 90phi in 200g (carbon black content concentration 20wt%) of water color ink. 3 micrometers 0.8 mum and 0.65 micrometers 0.45 micrometers The filtration trial was performed under reduced pressure of 2.7 KPa using the filter, and

filtration through put was measured.

[0035] ** rate of precipitate residue; -- weight ratio (M1/M0) of the amount of precipitate residue (M1) after performing at-long-intervals alignment separation processing for water color ink (carbon black content concentration 20wt%) with the gravitational acceleration of 20000G for 30 minutes, and the weight (M0) of the carbon black before centrifugal separation processing It considered as the rate of precipitate residue. Distributed stability is so good that this value is low.

[0036]

[Table 2]

例No.		実 施 例			比 較 例				
		1	2	3	1	2	3	4	5
保存安定性	初期粘度(cp)	4.51	5.12	5.98	2.54	3.34	3.34	3.65	15.6
	70℃、1 W後(cp)	4.51	5.11	5.94	2.54	3.34	3.34	3.65	ゲル化
	70℃、2 W後(cp)	4.50	5.10	5.94	2.53	3.31	3.31	3.65	—
	70℃、3 W後(cp)	4.49	5.10	5.92	2.53	3.30	3.30	3.59	—
	70℃、4 W後(cp)	4.48	5.09	5.91	2.53	3.28	3.28	3.57	—
平均粒径	初期平均粒径(nm)	104.2	94.8	98.7	41.5	32.1	90.5	96.3	142.5
	70℃、1 W後(nm)	104.2	94.5	98.5	41.5	32.1	90.1	96.2	ゲル化
	70℃、2 W後(nm)	104.1	94.2	98.4	41.4	32.1	89.9	96.1	—
	70℃、3 W後(nm)	103.9	94.2	98.4	41.3	32.0	89.7	96.1	—
	70℃、4 W後(nm)	103.7	93.8	98.1	41.2	32.0	89.5	96.1	—
最大粒径	初期最大粒径(nm)	205.1	198.9	191.2	162.3	145.2	195.4	214.2	345.6
	70℃、1 W後(nm)	205.0	198.4	190.4	162.1	145.2	195.3	214.2	ゲル化
	70℃、2 W後(nm)	204.8	198.1	190.1	161.9	145.2	195.3	214.1	—
	70℃、3 W後(nm)	204.1	197.5	189.7	161.8	145.1	195.2	214.1	—
	70℃、4 W後(nm)	204.0	197.1	189.5	161.7	145.1	195.2	214.0	—
濾過性 %	No. 2濾紙	100	100	100	100	100	100	100	0
	膜孔径 (3 μm)	100	100	100	100	100	100	100	0
	膜孔径 (0.8 μm)	100	100	100	100	100	100	100	0
	膜孔径 (0.65 μm)	100	100	100	100	100	100	100	0
	膜孔径 (0.45 μm)	40	45	35	50	70	50	60	0
印字濃度 ; コピー紙 (OD値)		1.51	1.49	1.52	0.98	0.92	1.41	0.84	1.62
沈殿残渣率 (%)		7.1	6.9	5.4	12.5	11.1	11.3	6.8	72.1

[0037] Although the water color ink which was distributed and prepared the carbon black pigment of an example from the result of Tables 1 and 2 has the outstanding preservation stability, filterability, paper fixing concentration, and a rate of precipitate residue, and filterability and preservation stability are good since the examples 1 and 2 of a comparison have IA, N2 SA, CTAB, DBP, and small 24M4DBP, paper fixing concentration is remarkably low and the rate of precipitate residue is high. Although preservation stability, filterability, and paper fixing concentration are good since the example 3 of a comparison has IA, N2 SA, and small CTAB, the rate of precipitate residue is highly poor. Although preservation stability, filterability, and the rate of precipitate residue are good since the example 4 of a comparison

has low DBP, paper fixing concentration is remarkably low. Although the property of carbon black conforms to the range, since the ratio of a total carbon atom and all oxygen atoms is small, the example 5 of a comparison has high initial viscosity, and is remarkably poor. [of preservation stability]

[0038]

[Effect of the Invention] According to the carbon black pigment for water color ink of this invention the above passage, it can be compatible in the relation between opposite paper fixing concentration, filterability, and the rate of precipitate residue, and the carbon black pigment in which the dispersibility continued and stabilized at the long period of time is shown further can be offered. Therefore, it is very useful as black pigments for water color ink including the water color ink for ink jet printers.

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